Perovskite RRAM Devices with Metal/Insulator/PCMO/Metal Heterostructures

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Perovskite non-volatile resistive random access memory (RRAM) devices with metal/insulator/$Pr_{0.7}Ca_{0.3}MnO_3$ (PCMO)/metal thin film heterostructures have been fabricated and characterized as to performance. The insulator layer was grown as a buffer layer between the active CMR perovskite and the top metal contact. For these buffer layer heterostructure devices, the pulse voltage needed to switch the device is significantly reduced and the resistance-switching ratio is increased as compared to a non-buffered (RRAM) device. The magnetic field effect on the multilayer heterostructure device resistance at various temperatures shows CMR behavior for both high and low resistance states indicating a CMR component to the switching. The switching mechanism of these devices will be discussed.